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ABSTRACT

One of a series of curriculum guides prepared for the building occupations cluster of the construction/fabrication occupational group, this guide identifies the essentials of the masonry trade as recommended by the successful mason. An instructional program based upon the implementation of the guide is expected to prepare a student to adequately perform entry level tasks required of a mason or to enter a post-secondary technical or apprenticeship program in masonry where additional depth can be realized. Trade tasks or information are listed in chart form under the headings of safety; blueprint reading and planning; labor and material estimating; tools and equipment; operations and/or jobs; and general competencies. Space is provided on the charts to record for each item the date completed, teaching methods used, and teaching materials used. Also included are a list of teacher responsibilities, sources of occupational information, recommended tests and references, and a chart depicting the total construction/fabrication occupational curriculum. A typical application for employment and a sample trade and industrial education injury report are appended. (HD)

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TRADE AND INDUSTRIAL EDUCATION

# TRADE PREPARATORY TRAINING GUIDE

# MASONRY

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CE 007 561

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## DEFINITIONS USED IN THIS GUIDE

**Major Occupational Group**

A grouping of similar and related occupational area clusters. These groups include occupations that have been determined to be the most relevant and pertinent for inclusion in vocational education in Nebraska.

**Occupational Area Clusters**

These clusters are distinguishable in terms of similar work performed, materials used, products produced, and/or services rendered. They include a wide variety of common occupational skills and knowledge.

**Occupation**

The career or employment engaged in by an individual for remuneration. This activity includes technical competencies and related technical information often referred to as one's vocation.

**Technical Competency**

The specific tasks required for a vocational trade and industrial graduate to perform successfully at the entry level in an occupational area. These technical competencies apply to the psychomotor domain and include elements which emphasize motor skills such as: operate a machine; measure; etc.

**Related Technical Information**

The information the entry level worker must know in order to make appropriate trade decisions which will allow him to adequately perform the tasks or technical competencies of his occupation. This information applies to the cognitive domain and includes elements which are intellectual outcomes such as: knowledge and understanding.

**Related General Information**

Information which is desirable and good for the tradesman to know but which is not necessary to do his work properly; information that is nice to know, such as the history and development of his trade.

**Related Guidance Information**

Information that helps the student choose, prepare for, secure, hold, and make progress in an occupation.

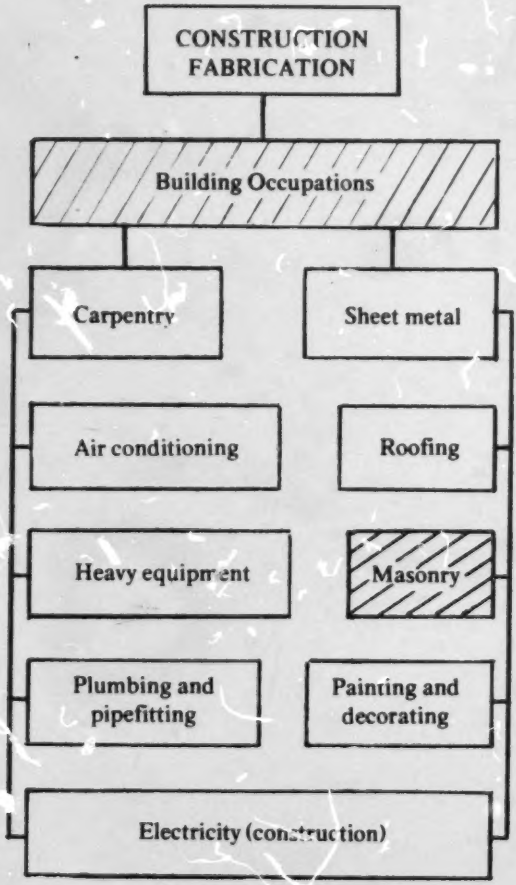
**Entry Level**

The technical competencies and related technical information deemed necessary by industry for obtaining and holding a job in a specific occupational area. This level of employment includes the technical competencies and related technical information that will be utilized by the employee within the first year of employment.

## Occupational Analysis Chart

The chart on the following page shows Masonry as it relates to other occupations within the Building occupations cluster. Building Occupations is one of two clusters which is a part of the major occupational group entitled Construction/Fabrication. This guide is concerned with Masonry only. Other guides have been prepared for each of the occupations found in this chart and are available through the Nebraska State Department of Education.

### OCCUPATIONAL ANALYSIS CHART
### [PROJECT MODEL]



## INTRODUCTION

This curriculum guide has been prepared with the help of competent craftsmen in the building trades. The funds that made this guide a reality were provided through a federal research grant in cooperation with the Nebraska State Board for Vocational Education and sponsored by the Nebraska Research Coordinating Unit.

Curriculum guides have been prepared for several trade and industrial occupational clusters from which high school teachers can develop appropriate occupational related experiences for their students. The major occupational groups, occupational area clusters, and occupations are shown in graphic form on pages of this guide.

Selection of trades within four major occupational groups have been made based on a three year survey by the Nebraska Research Coordinating Unit on needs of Nebraska business and industry. This study has identified the occupations with the greatest need for employees. A related set of curriculum guides have been prepared for these occupations.

**Guidance Information**

The U.S. Department of Labor has developed an extremely helpful book entitled, "Occupational Outlook Handbook." This annual publication provides a very complete description of the activities of the persons employed in the occupations represented in the Nebraska trade and industrial curriculum guides. Information concerning current and future opportunities is a major portion of this publication. Inexpensive reprints in booklet form that describe individual occupations are available through the Department of Labor. These booklets should be used by trade and industrial teachers and school guidance counselors for the most up-to-date guidance information about a particular occupation.

A listing of these reprints from the "Occupational Outlook Handbook," the order number, and price per copy is listed below for those occupations in the occupational area cluster of "Building Occupations."

| Number | Title | Price |
|---|---|---|
| 1650-69 | Bricklayers, Stonemasons, Marble Setters, Tile Setters, Terrazzo Workers | .20 |
| 1650-70 | Carpenters, Painters and Paperhangers, Glaziers | .20 |
| 1650-71 | Cement Masons, Lathers, Plasterers | .20 |
| 1650-72 | Construction Laborers and Hod Carriers | .15 |
| 1650-73 | Electricians (Construction) | 15 |
| 1650-75 | Floor Covering Installers | .15 |
| 1650-77 | Plumbers and Pipefitters | .15 |

1650-78 Roofers, Sheet-Metal Workers ..... .15

1650-80 Air-Conditioning, Refrigeration, and Heating Mechanics ..... .10

**The Masonry Guide**

This guide uses the title Masonry as the most logical descriptive term for identifying a particular related group of workers. Identification of specific job titles within this group should be determined by referring to the "Dictionary of Occupational Titles." The USOE classification system for coding instructional programs has assigned 17.1004 to the instructional program, Masonry.

The information within this guide identifies the essentials of the masonry trade as recommended by the successful mason. An instructional program based upon the implementation of this guide will prepare a student to adequately perform entry level tasks required of a mason or to enter a post-secondary technical or apprenticeship program in masonry where additional depth can be realized.

The tasks and/or competencies identified within these covers are those agreed upon by a jury of reputable Nebraska masons. A separate group of persons directly employed within this trade in Nebraska have further verified these tasks and/or competencies. Jury members, tradesmen, and educators who contributed toward the development of content for this guide are listed in the front.

Course offerings in trade and industrial education in Nebraska are to be organized within two period blocks of time each day, five days a week. Time is to be set aside for classroom instruction directly related to manipulative laboratory instruction. The remainder of the student's school day is to be utilized for general education subjects.

## USE OF THIS GUIDE

The use of curriculum guides for trade and industrial education in Nebraska secondary schools may vary greatly, depending upon the depth and breadth of each school district's vocational program. Large school districts, for example, may utilize one particular curriculum guide to develop a course in a trade area such as masonry. A small school district may, on the other hand, incorporate several curriculum guides to develop a course in the building trades occupational cluster.

The manipulative content identified in this guide is deemed necessary for inclusion in a course that is designed to prepare entry level masons. While not all secondary school facilities in Nebraska are equipped to expose students to all of this content through hands-on experience, it is assumed that this content will through some media become related technical information. This will insure inclusion of all content and provide at least discussion level understanding.

This guide is written with the assumption and expectation that the related technical information necessary to perform technical competencies will be an integral part of instruction. Thus, occupational decisions that must be made by an entry level worker will be developed along with each related manipulative activity.

The masonry instructor who uses this guide is responsible for including the identified related technical information as well as the identified manipulative tasks. He is also responsible for the identification of competencies pertaining to general and guidance information, even though this information is not specifically identified for him.

Definitions for various terms used in this guide are presented in the front.

## TEACHER RESPONSIBILITIES*

1. Use the American Vocational Association National Safety Council's "National Standards School Shop Safety Inspection Check List" for shop safety inspections. (Available from American Vocational Association, 1510 "H" Street, N.W., Washington, D.C. 20005)
2. Use safety check list to assure safe factors exist.
3. Require students to report ALL accidents to instructor.
4. Keep complete records of ALL accidents on file.
5. Report ALL accidents to the school administration.
6. Develop safety consciousness in the students through teacher example—always doing things in the safe way.
7. Give shop demonstrations stressing safe use of machines.
8. Give shop demonstrations stressing safe use of hand tools.
9. Provide instruction on what to do in case of an accident.
10. Develop information sheets dealing with the safe use of specific machines.
11. Give demonstrations on the proper use and care of personal protective devices.
12. Develop information sheets dealing with the general safety rules for the trade.
13. Enclose all gears, moving belts, and other power transmission devices with permanent guards.
14. Prohibit students from operating machines when instructor is not present.
15. Prohibit the removal of guards and safety devices, even for a brief period, without the approval of the instructor.
16. Prohibit more than one operator from using a machine at one time.
17. Determine personal liability factors and liability coverage afforded through your school.
18. Provide for the bulk storage of flammable materials.
19. Mark the location of fire-fighting equipment.
20. Post instructions and inform students of building evacuation procedures.
21. Require the wearing of appropriate eye protection as specified by the State of Nebraska eye safety regulations.
22. Keep tools sharp, clean and in good working condition.

*These responsibilities are necessary for inclusion in all trade and industry programs in the State of Nebraska.

23. All shop personnel should be thoroughly familiar with the location of fire extinguishers and the type fire for which each extinguisher is designed.

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**MASONRY CONTENT**
**[Identified Trade Tasks and Information]**
**17.2099 - Cement Mason-Construction**

12

| TRADE TASK OR INFORMATION | DATE COMPLETED | TEACHING METHODS USED | TEACHING MATERIALS USED |
|---|---|---|---|
| SAFETY | | | |
| Report unsafe conditions to immediate supervisor. | | | |
| Identify safe or unsafe areas at job or construction site. | | | |
| Exercise care in handling or using tools and machines. | | | |
| Follow safe practices when working on the construction site. | | | |
| BLUEPRINT READING AND PLANNING | | | |
| Read and follow plans and diagrams in order to properly construct a structure. | | | |
| Follow local building codes and contractor's instructions. | | | |

| TRADE TASK OR INFORMATION | DATE COMPLETED | TEACHING METHODS USED | TEACHING MATERIALS USED |
|---|---|---|---|
| LABOR AND MATERIAL ESTIMATING | | | |
| Estimate total cost of work. | | | |
| Estimate labor. | | | |
| Estimate amount of scaffolding needed. | | | |
| Estimate amount of concrete needed. | | | |
| TOOLS AND EQUIPMENT | | | |
| Use and maintain the following tools and machines according to commonly accepted trade standards: | | | |
| edgers | | | |
| trowels | | | |
| screeds | | | |
| templates | | | |

internal vibrators

external vibrators

gasoline-operated tamping machines

transit

concrete calculator

sandblasting equipment

floats (wood and steel)

concrete mixers

power trowels

power saws (concrete, etc.)

electric drill

plumb bob and lines

steel rule

steel tape

| TRADE TASK OR INFORMATION | DATE COMPLETED | TEACHING METHODS USED | TEACHING MATERIALS USED |
|---|---|---|---|
| levels | | | |
| OPERATIONS AND/OR JOBS | | | |
| Use fabrics, plastic sheets, or waterproof paper to cure and protect concrete. | | | |
| Use concrete detergent to clean concrete surfaces. | | | |
| Use chemicals to cure and protect concrete. | | | |
| Use coloring to obtain the desired color of concrete. | | | |
| Build uncomplicated forms. | | | |
| Cut reinforcement steel to proper lengths and shapes. | | | |
| Construct a wooden scaffold. | | | |
| Construct waterways and spillways. | | | |

Bend reinforcement steel as required.

Apply surface coating to concrete surfaces using cement/sand/water/additive mortar mixture.

Construct steps.

Construct a manhole.

Use a wire brush to clean concrete surfaces.

15. Point up a steel sash encased in concrete.

Use carborundum stone to clean concrete surfaces.

Point up and burlap finish exposed concrete.

Mix and apply dry-pack.

Cut out defective or excess concrete.

Construct curb and gutters.

Construct stoops.

| TRADE TASK OR INFORMATION | DATE COMPLETED | TEACHING METHODS USED | TEACHING MATERIALS USED |
|---|---|---|---|
| Construct walkways. | | | |
| Construct sidewalks. | | | |
| Construct floor slabs. | | | |
| Position concrete truck for pouring operations. | | | |
| Form joints and drains. | | | |
| Use brooms and brushes to texture concrete. | | | |
| Fill concrete forms using wheelbarrows, chutes, buggies, and downpipes. | | | |
| Operate a power mixer to mix concrete. | | | |
| Assemble a pre-cut metal scaffold. | | | |
| Anchor reinforcement in forms. | | | |
| Lay tile drainage bed around footings. | | | |

## GENERAL COMPETENCIES

Coordinate with carpenter in placement of forms.

Determine proper proportions of water, cement, sand, and aggregate to be used in a batch of cement.

Possess knowledge of requirements for forms.

**MASONRY CONTENT**
**[Identified Trade Tasks or Information]**
**17.1004-Bonding Materials & Block Forms**

| TRADE TASK OR INFORMATION | DATE COMPLETED | TEACHING METHODS USED | TEACHING MATERIALS USED |
|---|---|---|---|
| SAFETY | | | |
| Use safety procedures when working on the construction site. | | | |
| Exercise care in handling or using tools and machines. | | | |
| Correct unsafe conditions of tools and machines. | | | |
| Use safety procedures when transporting brick and mortar on the job. | | | |
| Report unsafe conditions to the immediate supervisor. | | | |
| Identify safe and unsafe areas on job or construction site. | | | |
| BLUEPRINT READING AND PLANNING | | | |
| Read and follow plans and specifications when building structures. | | | |

| TRADE TASK OR INFORMATION | DATE COMPLETED | TEACHING METHODS USED | TEACHING MATERIALS USED |
|---|---|---|---|
| LABOR AND MATERIAL ESTIMATING | | | |
| Estimate cost of building masonry structures. | | | |
| Estimate number of man-hours required to complete a job. | | | |
| Estimate number of bricks, blocks, and other related materials needed for a job. | | | |
| Estimate amount of mortar for jobs. | | | |
| Estimate amount of scaffolding required for the job. | | | |
| TOOLS AND EQUIPMENT | | | |
| Use and maintain the following tools and equipment: | | | |
| stone chisles | | | |

electric brick saw

brick jointer

brick set

trowels

brick hammer

story pole

levels

floats

power saws

power drills

star drills

plumb bob

steel rules and tapes

transit

| TRADE TASK OR INFORMATION | DATE COMPLETED | TEACHING METHODS USED | TEACHING MATERIALS USED |
|---|---|---|---|
| OPERATIONS AND/OR JOBS | | | |
| Mix mortar to correct proportions. | | | |
| Lay brick from a straight lead. | | | |
| Lay common bond. | | | |
| Lay brick by a line from a built up corner. | | | |
| Lay soldier courses | | | |
| Lay American bond. | | | |
| Hang a plumb bob. | | | |
| Finish head joints. | | | |
| Finish bed joints. | | | |
| Clean masonry using detergent colutions. | | | |
| Clean masonry using acid solutions. | | | |
| Mix mortar with a motor driven mixer. | | | |

Mix mortar with a hoe and mortar box.

Hand butter bricks and blocks.

Assemble factory made metal scaffolding.

Clean masonry using wire brush.

Clean masonry using cement-mortar mixtures.

Waterproof walls and structures.

Lay a flat sill.

Check corners with a story pole.

Lay corners by using a plumb bob.

Lay corners by using a level.

Position a range line.

Lay Basket bond.

Lay Herringbone bond.

Lay Flemish bond.

| TRADE TASK OR INFORMATION | DATE COMPLETED | TEACHING METHODS USED | TEACHING MATERIALS USED |
|---|---|---|---|
| Lay English bond. | | | |
| Construct scaffold of wood. | | | |
| Clean masonry using sand blasting equipment. | | | |
| Use color additives for desired effects and tones. | | | |
| Lay 12", 16", 20", and 24" piers. | | | |
| Lay header course and closure. | | | |
| Lay a stretcher course. | | | |
| Install metal ties and reinforcing wire. | | | |
| Seal joints using oakum or calking compound. | | | |
| Lay natural stone. | | | |
| Install rubber, copper, and aluminum sill flashing. | | | |

Lay 4" and 8" walls.

Lay a row lock sill.

Lay 4" and 8" lead walls.

Lay 4" and 8" lead angles.

Lay 4" and 8" pilasters.

Spread, slice, pick up, and trench mortar.

Finish the following types of joints:

- flush
- raked
- "V"
- weathered
- struck
- concave
- convex

| TRADE TASK OR INFORMATION | DATE COMPLETED | TEACHING METHODS USED | TEACHING MATERIALS USED |
|---|---|---|---|
| hanging mortar | | | |
| GENERAL COMPETENCIES | | | |
| Possess knowledge of desirable types of face, and natural stone. | | | |
| Possess knowledge of different types of aggregate and sand for mortar. | | | |
| Possess knowledge of correct bonding materials for specific jobs. | | | |
| Possess knowledge of local building codes. | | | |

## Appendix A

One of the primary objectives of trade and industrial education is the successful placement of students completing course work in a specific occupation. The following sample application form is included in this guide with the recommendation that the preparation of such forms become a necessary activity for students in all trade and industrial education courses.

### APPLICATION FOR EMPLOYMENT

**PERSONAL INFORMATION**

DATE _____ SOCIAL SECURITY NUMBER _____

NAME _____ (LAST / FIRST / MIDDLE)

PRESENT ADDRESS _____ (STREET / CITY / STATE)

PERMANENT ADDRESS _____ (STREET / CITY / STATE)

PHONE NO _____ OWN HOME _____ RENT _____ BOARD _____

DATE OF BIRTH _____ HEIGHT _____ WEIGHT _____ COLOR OF HAIR _____ COLOR OF EYES _____

MARRIED _____ SINGLE _____ WIDOWED _____ DIVORCED _____ SEPARATED _____

NUMBER OF CHILDREN _____ DEPENDENTS OTHER THAN WIFE OR CHILDREN _____ CITIZEN OF U. S. A. YES ○ NO ○

IF RELATED TO ANYONE IN OUR EMPLOY, STATE NAME AND DEPARTMENT _____ REFERRED BY _____

**EMPLOYMENT DESIRED**

POSITION _____ DATE YOU CAN START _____ SALARY DESIRED _____

ARE YOU EMPLOYED NOW? _____ IF SO MAY WE INQUIRE OF YOUR PRESENT EMPLOYER _____

EVER APPLIED TO THIS COMPANY BEFORE? _____ WHERE _____ WHEN _____

| EDUCATION | NAME and LOCATION OF SCHOOL | YEARS ATTENDED | DID YOU GRADUATE | SUBJECTS STUDIED |
|---|---|---|---|---|
| GRAMMAR SCHOOL | | | | |
| HIGH SCHOOL | | | | |
| COLLEGE | | | | |
| TRADE, BUSINESS OR CORRESPONDENCE SCHOOL | | | | |

SUBJECTS OF SPECIAL STUDY OR RESEARCH WORK _____

WHAT FOREIGN LANGUAGES DO YOU SPEAK FLUENTLY? _____ READ _____ WRITE _____

U. S. MILITARY OR NAVAL SERVICE _____ RANK _____ PRESENT MEMBERSHIP IN NATIONAL GUARD OR RESERVES _____

(CONTINUED ON OTHER SIDE)

**FORMER EMPLOYERS** (LIST BELOW LAST FOUR EMPLOYERS, STARTING WITH LAST ONE FIRST.)

| DATE MONTH AND YEAR | NAME AND ADDRESS OF EMPLOYER | SALARY | POSITION | REASON FOR LEAVING |
|---|---|---|---|---|
| FROM<br>TO | | | | |
| FROM<br>TO | | | | |
| FROM<br>TO | | | | |
| FROM<br>TO | | | | |

**REFERENCES:** GIVE BELOW THE NAMES OF THREE PERSONS NOT RELATED TO YOU, WHOM YOU HAVE KNOWN AT LEAST ONE YEAR.

| | NAME | ADDRESS | BUSINESS | YEARS ACQUAINTED |
|---|---|---|---|---|
| 1 | | | | |
| 2 | | | | |
| 3 | | | | |

**PHYSICAL RECORD:**

LIST ANY PHYSICAL DEFECTS

WERE YOU EVER INJURED? GIVE DETAILS

HAVE YOU ANY DEFECTS IN HEARING? IN VISION? IN SPEECH?

IN CASE OF EMERGENCY NOTIFY

NAME ADDRESS PHONE NO.

I AUTHORIZE INVESTIGATION OF ALL STATEMENTS CONTAINED IN THIS APPLICATION. I UNDERSTAND THAT MISREPRESENTATION OR OMISSION OF FACTS CALLED FOR IS CAUSE FOR DISMISSAL. FURTHER, I UNDERSTAND AND AGREE THAT MY EMPLOYMENT IS FOR NO DEFINITE PERIOD AND MAY, REGARDLESS OF THE DATE OF PAYMENT OF MY WAGES AND SALARY, BE TERMINATED AT ANY TIME WITHOUT ANY PREVIOUS NOTICE.

DATE SIGNATURE

**DO NOT WRITE BELOW THIS LINE**

INTERVIEWED BY DATE

**REMARKS:**

| | | | |
|---|---|---|---|
| NEATNESS | | CHARACTER | |
| PERSONALITY | | ABILITY | |

HIRED FOR DEPT. POSITION WILL REPORT SALARY WAGES

APPROVED: 1. EMPLOYMENT MANAGER 2. DEPT. HEAD 3. GENERAL MANAGER

## Appendix B

One of the most important parts of any trade and industrial education course is a safety program. The following form is recommended for use in courses of this type.

**SAMPLE**
**TRADE AND INDUSTRIAL EDUCATION**
**INJURY REPORT* ****

Student injured _____ Date _____

Shop in which accident occurred _____ Time _____

Instructor in charge _____

Nature of injury _____

_____

First aid administered _____

_____ By whom? _____

Cause of injury _____

_____

Could injury have been prevented? _____ How? _____

_____

Action taken or recommendations made to prevent recurrence _____

Remarks: _____

_____

_____

Signed _____
(Person making report)

Witnesses: _____

Names _____
and
Addresses _____

*Complete in Duplicate
**File one copy in office

## RECOMMENDED TEXTS AND REFERENCES

### Masonry

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lists innumerable sources of great value to the T & I teacher. These free or inexpensive materials have been printed by the U.S. Government Printing Office. Your copy of this catalog will cost $1.50 and is available from the following address:

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